TETRA TECH

August 31, 2017

Ms. Tonya Howell
Remedial Project Manager
U.S. Environmental Protection Agency, Region 7
11201 Renner Blvd
Lenexa, Kansas 66219

Subject: **Engineering Evaluation/Cost Analysis, Revision 03**
Des Moines TCE NPL Site, Operable Unit 04, Buildings
Des Moines, Iowa
U.S. EPA Region 7 START 4, Contract No. EP-S7-13-06, Task Order No. 0144
Task Monitor: Tonya Howell

Dear Ms. Howell:

Tetra Tech, Inc. is submitting the attached Engineering Evaluation/Cost Analysis (Revision 03) report regarding the Des Moines TCE NPL site, Operable Unit 04, Buildings, in Des Moines, Iowa.

If you have any questions or comments, please contact me at (816) 412-1767.

Sincerely,

Mike Williams, CPG
START Project Manager

Ted Faile, PG, CHMM
START Program Manager

Enclosures

cc: Debra Dorsey, START Project Officer (cover letter only)

X9025.16.0144.000

415 Oak Street, Kansas City, MO 64106
Tel 816.412.1741 Fax 816.410.1748

www.tetratech.com

DES MOINES TCE NPL SITE
OPERABLE UNIT 04
BUILDINGS
DES MOINES, IOWA
ENGINEERING EVALUATION/COST ANALYSIS
REVISION 03

Superfund Technical Assessment and Response Team (START) 4

Contract No. EP-S7-13-06, Task Order 0144

Prepared For:

U.S. Environmental Protection Agency
Region 7
11201 Renner Blvd.
Lenexa, Kansas 66219

August 31, 2017

Prepared By:

Tetra Tech, Inc.
415 Oak Street
Kansas City, Missouri 64106
(816) 412-1741

CONTENTS

CONTENTS (Continued)

TABLES

FIGURES

CONTENTS (Continued)

BUILDING SAMPLE RESULT TABLES

APPENDICES

ACRONYMS

ACM	Asbestos-containing material
AM	Action Memorandum
AOC	Area of contamination
ARAR	Applicable or relevant and appropriate requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
COC	Chemical of concern
DCE	Dichloroethene
Dico	Dico, Inc.
EPA	U.S. Environmental Protection Agency
EE/CA	Engineering Evaluation/Cost Analysis
HDPE	High-density polyethylene
HHRA	Human health risk assessment
KDHE	Kansas Department of Health and Environment
LDR	Land disposal restriction
mil	0.001 inch
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operations and maintenance
OU	Operable unit
PCB	Polychlorinated biphenyl
PCE	Tetrachloroethene
ppm	Parts per million
RACER	Remedial Action Cost Engineering and Requirements
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
SPA	South Pond Area
START	Superfund Technical Assistance and Response Team
TBD	To be determined
TCE	Trichloroethene
Tetra Tech	Tetra Tech, Inc.
TSCA	Toxic Substances Control Act
US	United States
U.S.C.	*United States Code*

EXECUTIVE SUMMARY

This Engineering Evaluation/Cost Analysis (EE/CA) report evaluates technologies and alternatives for conducting a non-time critical removal action at Operable Unit (OU) 04 related to demolition of buildings at the Des Moines Trichloroethene (TCE) site (site) in Des Moines, Iowa. The non-time critical removal action is taken pursuant to the authority in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section (§) 104(a) (40 *United States Code [U.S.C]* § 9604[a]) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) at 40 Code of Federal Regulations (CFR) § 300.415. This report was prepared in accordance with the NCP, U.S. Environmental Protection Agency's (EPA) Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA (EPA 1993a), Use of Non-Time Critical Removal Authority in Superfund Response Actions (EPA 2000), and Response Actions at Sites with Contamination Inside Buildings (EPA 1993b).

The site is in south-central Des Moines on the east side of the Raccoon River. In all, the site encompasses more than 200 acres of which the Dico, Inc. (Dico) property makes up approximately 43 acres. The Dico property is southwest of the intersection of W. Martin Luther King Jr. Parkway and SW 16th Street in Des Moines, Polk County, Iowa. The site is within Section 8, Township 78 North, Range 42 West.

The Dico property includes several buildings used for a variety of industrial operations throughout its history. Buildings remaining on the Dico property to be addressed in this report include the Production Building; Buildings 1, 2, and 3; and slab foundations remaining for the Maintenance Building and Buildings 4 and 5. A former office building is also located on the Dico property, but is not addressed in this report.

In addition to the buildings, the Dico property includes a large area of soil contamination covered by an asphalt cap and building foundations. The extent of soil contamination beneath the buildings and slab foundations has yet to be defined. A drainage feature at the south end of the site is referred to as the "South Pond Area or SPA." Surface water and sediments at the SPA have been adversely impacted by site contaminants associated with the buildings (see Figure 2). Finally, a groundwater extraction system and air stripping tower are being used at the property to remove and treat contaminated groundwater.

For the purposes of this EE/CA, the Production Building is included as part of the site. However, since the Production Building was not part of the 1996 Record of Decision (ROD), it could be addressed outside of the EE/CA under a separate action. The SPA was identified in the 1996 Feasibility Study (Black and Veatch Special Projects Corp. [Black and Veatch] 1996) as part of OU4, called the South

Pond/Drainage Area Source Control OU. OU4 was originally delineated to address pesticide contamination in soils and buildings in the southeast portion of the site.

For approximately 40 years, historical operations at the site have included a variety of industrial uses and operations—steel wheel manufacturing, chemical and herbicide distribution, and pesticide formulation processes. Releases during Dico's operations at the site included the following: TCE, 1,2-dichloroethene (DCE), and vinyl chloride in groundwater; residual pesticides, dioxins, polychlorinated biphenyls (PCBs), and metals in shallow soils; and pesticides, dioxins, and PCBs within buildings and drainage areas.

In June 2016, Tetra Tech, Inc. (Tetra Tech) conducted an environmental characterization of buildings and foundations on site. Wipe samples were collected from building surfaces, building material samples were collected from various materials within the buildings, and concrete core samples were collected from building foundations and slabs. Consistent with historical sampling, results of the site characterization indicated the presence of pesticides, PCBs, and dioxins in several building materials across the site.

Several pesticides were detected in samples of building materials and concrete, and in wipe samples collected during the sampling event. Pesticides detected in the slab foundations of the Maintenance Building and Building 4 contained Resource Conservation and Recovery Act (RCRA) listed wastes as a result of spills of listed waste when Aldrin (Hazardous Waste Code P004) stored in the Maintenance Building was transferred to Building 4 and sprayed onto fertilizer. A 2,000-gallon vessel formerly stored in the Maintenance Building was used to heat Aldrin during formulation operations (Eckenfelder Inc. 1992). The Aldrin vessel and surrounding soils were removed as part of a previous response action at the site.

It is unclear if contamination within the remaining buildings and slab foundations on site derived from poor waste management or releases of product that is not RCRA listed waste. Therefore, the source is unknown and is not considered a RCRA listed waste. Pesticides detected in the Production Building; Buildings 1, 2, and 3; and the slab foundation remaining for Building 5 may contain RCRA characteristic waste and therefore would be sampled prior to disposal.

Due to changing land use—rezoning from industrial to Central Business Mixed Use District C-3 B designation—demolition of contaminated on-site buildings is required. Potentially toxic and hazardous substances within the buildings and slab foundations present an actual or potential exposure to human health and the environment. This EE/CA report evaluates alternatives for addressing potential human health risk associated with buildings and slabs that remain on site. This EE/CA report addresses the

buildings and slabs that remain on site and does not include an evaluation of alternatives to address groundwater beneath the buildings and slabs. The remedy selected for site soils in the 1996 ROD remains in place and has been determined to be protective of human health and the environment (EPA 2013). However, it is important to note that this protectiveness determination was based on the fact that contaminated site soils remain covered, thereby preventing direct exposure to human or environmental receptors. If building foundations are removed, there could be an unacceptable health threat associated with exposures to contaminated soils that become uncovered. However, the extent of soil contamination beneath the buildings and slab foundations has yet to be defined. If slab foundations are removed, soils will be sampled to determine if an unacceptable health risk is present.

Removal action objectives for the site buildings were developed and include:

- Eliminate human exposure via inhalation, incidental ingestion, and dermal absorption to contamination present within site buildings.
- Prevent human exposure to chemicals of concern (COC) in potentially contaminated soil at levels that pose unacceptable risk to commercial and recreational uses.

Alternatives to address the buildings and slab foundations, which will meet these new removal action objectives, are evaluated in this EE/CA.

Cleanup levels for building material and slab foundations were not developed because building materials cannot be compared with published or site-specific risk-based screening levels for soil, sediment, surface water, groundwater, air or other natural media. Cleanup levels for soil have also not been developed. However, if slab foundations are removed at the site, soils will be sampled to determine if an unacceptable health risk is present and if present, cleanup levels will be developed for soil.

Removal action alternatives evaluated in this EE/CA report vary in cost and protection they afford to human health. These alternatives include: (1) No Action, (2) Building Demolition with Off-site Disposal, and (3) Building Demolition with On-site Containment. Alternatives 2 and 3 include the demolition of on-site buildings including the Production Building, Buildings 1, 2, and 3, and the slab foundations of the former Maintenance Building and Buildings 4 and 5. Both Alternatives would include an asbestos survey and abatement of asbestos material prior to demolition. Materials classified as asbestos-containing material (ACM) will be disposed of off-site as special waste. Insulation in the Production Building and Buildings 1, 2, and 3 contains PCBs based on historical sampling data and the 2016 site characterization. Insulation-containing PCBs will be removed prior to demolition of buildings

and disposed of as appropriate and in accordance with state requirements. During demolition, metal materials (i.e., rebar, steel beams) will be separated, decontaminated if necessary and recycled at a local scrap yard. Residue from decontamination procedures determined to contain PCBs will be disposed of as PCB remediation waste. Demolition debris remaining following the above activities will be sampled to determine the concentration of any site contaminants and whether the materials are classified as a RCRA characteristic waste. These sampling results will determine appropriate disposal methods and locations. Demolition equipment will be decontaminated on site. No soils will be removed as part of either alternative.

EPA's preferred alternative for addressing contamination within buildings is Alternative 2, Building Demolition with Off-site Disposal, and includes demolishing buildings and slab foundations, disposing of any hazardous debris at an off-site landfill, and capping exposed soil with a vegetative cover, depending on potential unacceptable risk from site soils and redevelopment plans. The cost for this option is estimated to be between $11,127,000 and $12,846,000 depending on the amount of demolition debris determined to be hazardous and the need for the vegetative cover. This alternative achieves substantial risk reduction and addresses the buildings and slab foundations as a source of contamination at the site. The proposed non-time critical removal action will be consistent with the final remedy for the site.

It is important to note that there may be opportunities for substantial cost savings. For example, slab foundations may be able to remain on site depending upon the plan for site development, such as one or more new mixed-use buildings at the same locations. In addition, the vegetative cover may not be necessary depending on the plan for site development and the timing of the implementation of that plan. Potential cost savings for each alternative are discussed in Sections 5.2.3 and 5.3.3 and are shown in Tables 2 and 3 in Section 6.0. The estimated cost of Alternative 2 is between $11,127,000 and $12,846,000. If the Production Building is not included as part of Alternative 2, the estimated cost would be between $5,226,000 and $6,945,000. The potential cost savings for Alternative 2 range from $232,000 to $4,031,000. These cost savings are discussed in Section 5.2.3. The estimated cost of Alternative 3 is $13,939,000. If the Production Building is not included as part of Alternative 3, the estimated cost would be about $9,333,000. The potential cost savings for Alternative 3 range from $582,000 to $3,620,000. These cost savings are discussed in Section 5.3.2.

1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA) directed the Tetra Tech Inc. (Tetra Tech) Superfund Technical Assessment and Response Team (START) to prepare an Engineering Evaluation/Cost Analysis (EE/CA) report regarding the Des Moines Trichloroethene (TCE) site (site) in Des Moines, Iowa (Figure 1) to support the completion of a non-time critical removal action related to demolition of buildings at the site. The non-time critical removal action is taken pursuant to the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Section (§) 104(a) (40 *United States Code [U.S.C]* § 9604[a]) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) at 40 Code of Federal Regulations (CFR) § 300.415.

According to 40 CFR § 300.415 (b), at any release, regardless of whether the site is included on the National Priorities List (NPL), where the lead agency makes the determination that there is a threat to public health or welfare of the United States or the environment, the lead agency may take any appropriate removal action to abate, prevent, minimize, stabilize, mitigate, or eliminate the release or the threat of release. Factors applicable to the removal action planned for this site are as follows:

(i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;

(ii) High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate;

(iii) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released; and

(iv) The availability of other appropriate federal or state response mechanisms to respond to the release.

In addition to considering the NCP factors above, the following factors were considered in determining whether to employ a Non-Time Critical Removal Action:

1. Time-sensitivity of the response;

2. Complexity of both the problems to be addressed and the action to be taken;

3. Comprehensiveness of the proposed action; and

4. Likely cost of the action.

The goals of an EE/CA, according to EPA's Guidance on Conducting Non-Time-Critical Removal

Actions under CERCLA are based on the relevant factors in 40 CFR § 300.415 as described above and the following: (1) to satisfy environmental review requirements for removal actions, (2) to satisfy administrative record requirements for improved documentation of removal action selection, and (3) to provide a framework for evaluating and selecting alternative technologies (EPA 1993a). This EE/CA addresses Operable Unit (OU) 04 related to demolition of buildings.

The site is in south-central Des Moines on the east side of the Raccoon River (Figure 1). In all, the site encompasses more than 200 acres of which the Dico property makes up approximately 43 acres. The Dico property is southwest of the intersection of W. Martin Luther King Jr. Parkway and SW 16th Street in Des Moines, Polk County, Iowa. The site is within Section 8, Township 78 North, Range 42 West. The Dico property includes several buildings used for a variety of industrial operations throughout its history. Buildings remaining on the Dico property to be addressed in this report include the Production Building; Buildings 1, 2, and 3; and slab foundations remaining for the Maintenance Building and Buildings 4 and 5. A former office building is also located on the Dico property, but is not addressed in this report. In addition to the buildings, the Dico property includes a large area of soil contamination covered by an asphalt cap, a groundwater extraction system and air stripping tower, and a surface water feature at the south end of the site that is referred to as the "South Pond Area or SPA" (see Figure 2). For the purposes of this EE/CA, the Production Building is also included as part of the site. However, since the Production Building was not part of the 1996 Record of Decision (ROD), it could be addressed outside of the EE/CA under a separate action. The SPA was identified in the 1996 Feasibility Study as part of OU4, called the South Pond/Drainage Area Source Control OU. OU4 was originally delineated to address pesticide contamination in soils and buildings in the southeast portion of the site.

For approximately 40 years, historical operations at the site have included a variety of industrial uses and operations—steel wheel manufacturing, chemical and herbicide distribution, and pesticide formulation processes. Releases during Dico's operations at the site included the following: TCE, 1,2-dichloroethene (DCE), and vinyl chloride in groundwater; residual pesticides, dioxins, polychlorinated biphenyls (PCBs), and metals in shallow soils; and pesticides, dioxins, and PCBs within buildings and drainage areas. See the 1996 Feasibility Study for more information (Black and Veatch 1996).

The site is divided into four OUs:

- OU1 – groundwater TCE plume
- OU2 – originated as source soils associated with TCE groundwater contamination, but later focused on residual pesticides and metals in shallow soils.

- OU3 – source area of tetrachloroethene (PCE) groundwater contamination north of the site
- OU4 – pesticides, dioxins, and PCBs in several buildings onsite, and in drainage areas of the site, including the SPA.

The 1986 ROD addressed OU1 (EPA 1986), the 1992 ROD addressed OU3 (EPA 1992), and the 1996 ROD addressed OU2 and OU4 (EPA 1996). The 1996 ROD for OU2 and OU4 selected Building Alternative 2 – Limited Action and Soil Alternative 2 – Limited Action. Under these remedies, contamination within the buildings would remain encapsulated in place and exposure to the contamination would be controlled through long term maintenance of the encapsulation actions and land use controls to maintain an industrial use of the property (both engineered controls and institutional controls). In the mid-1990s, several response actions occurred to address exposures to contamination at the site in surface soils and buildings. These actions included capping onsite soils, cleaning interior building surfaces, repairing and sealing building insulation, and applying an encapsulant to building interior surfaces. Furthermore, a group of potentially responsible parties excavated contaminated soils from a drainage ditch adjacent to the site and from certain areas around the SPA (EPA 2012).

The 5-year review completed in April 2013 deferred the protectiveness determinations for OU4 and recommended sampling the SPA to assess ecological risks (EPA 2013). The 2013 5-year review also identified risk to trespassers in the buildings at OU4, due to broken windows and unsecured entrances in the buildings where the encapsulation over the contaminated areas has failed, and recommended monitoring to determine the extent of exposure to trespassers. Sampling and an ecological risk assessment for the SPA was completed in October 2015, and indicated an unacceptable risk to ecological receptors due to pesticide and PCB contamination (EPA 2015). An addendum to the 5-year review was then completed in 2016 (EPA 2016). This addendum indicated that trespassers from the indigent community were removed from the buildings at OU4 and security measures were put in place to prevent additional trespassing. The addendum recommended continued efforts to verify that the buildings containing contamination be made inaccessible to trespassers and updating the human health risk assessment (HHRA) to assess potential human health risk. This addendum indicated that the remedy at OU4 is protective regarding contamination in the buildings, but is not protective in the SPA due to the conclusion of the 2015 ecological risk assessment. A HHRA addendum was then completed in January 2017 as recommended by the 2016 5-year review addendum, and took into account new potential land uses at the OU and new data that had been acquired at the OU (Tetra Tech 2017). The HHRA addendum showed unacceptable risk to human receptors at the SPA. However, the addendum did not evaluate risk based on contamination in building materials because building materials cannot be

compared with published or site-specific risk-based screening levels for soil, sediment, surface water, groundwater, air or other natural media. Manufacturing operations at the site have ceased, and the only activities on site relate to operation and maintenance of the pump and treat remediation system associated with OU1 and maintenance of the asphalt cap covering contaminated site soils. The site is fenced, and the property owner provides site security.

Land use in the surrounding area is changing, and much of this area has been rezoned since the remedy was selected for OU2 and OU4 in the 1996 ROD. The City of Des Moines is planning on conducting a major redevelopment project in the River Point West area east of the Dico property. The site was previously zoned for industrial use. However, on June 13, 2005, most of the Dico property was rezoned to the Central Business Mixed Use District C-3 B designation. This allows for a variety of uses including residential, recreational, office, commercial, and retail. The changing land use of the site by its rezoning from industrial to mixed use, requires the demolition of contaminated on-site buildings. Potentially toxic and hazardous substances within the buildings and slab foundations present an actual or potential exposure to human health and the environment.

Due to the changing land use, this EE/CA report evaluates alternatives for addressing human health risk associated with buildings and slab foundations that remain on site in a way that is compatible with changing land use. This EE/CA report addresses the buildings and slab foundations that remain on site and does not include an evaluation of alternatives to address contaminated groundwater that may be beneath the buildings and slabs. The remedy selected for site soils in the 1996 ROD remains in place and has been determined to be protective of human health and the environment (EPA 2013). However, it is important to note that this protectiveness determination was based on the fact that contaminated site soils remain covered, thereby preventing direct contact exposures to contaminated soils. If building foundations are removed, there could be an unacceptable health threat associated with exposures to any contaminated soils that become uncovered (Figure 2 is a site layout map). However, the extent of soil contamination beneath the buildings and slab foundations has yet to be defined. If slab foundations are removed, soils will be sampled to determine if an unacceptable health risk is present.

This EE/CA report was prepared in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), EPA's Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA (EPA 1993a), Use of Non-Time Critical Removal Authority in Superfund Response Actions (EPA 2000), and Response Actions at Sites with Contamination Inside Buildings (EPA 1993b). The NCP defines appropriate remediation as a cost-effective action that effectively mitigates and minimizes threats

to and provides adequate protection of human health, welfare, and the environment. Removal action alternatives evaluated in this EE/CA report vary in cost and protection they afford to human health.

2.0 SITE CHARACTERIZATION

This section describes the extent of contamination at the site and identifies the applicable or relevant and appropriate requirements as they apply to each removal action alternative considered. A complete site characterization was done during the 1996 Feasibility Study prepared by Black and Veatch (Black and Veatch 1996).

2.1 EXTENT OF CONTAMINATION

In June 2016, Tetra Tech conducted an environmental characterization of buildings, foundations, soil below buildings, and the SPA. The building investigation included collection of the following samples for analyses for chemicals of concern (COC):

- Wipe samples from building surfaces
- Building material samples
- Concrete core samples from building foundations and slabs.

Consistent with historical sampling, results of the site characterization indicated the presence of pesticides, PCBs, and dioxins in several building materials across the site. Sample locations are shown on Figures 3 through 5; analytical summary tables (Tables 1 through 3 attached) correspond to each figure.

2.2 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

CERCLA § 121(d), 42 U.S.C. § 9621(d), requires that remedial actions attain—or the decision document justify waiver of—environmental regulations, standards, or criteria promulgated under federal or more stringent state laws determined to be applicable or relevant and appropriate requirements (ARAR). While CERCLA § 121(d) does not apply to removal actions, the NCP at 40 CFR § 300.415(j) provides that removal actions "shall to the extent practicable considering the exigencies of the situation, attain applicable or relevant and appropriate requirements (ARARs) under federal environmental or state environmental or facility siting laws." EPA has evaluated and identified potential ARARs for the non-time critical removal action.

The NCP at 40 *Code of Federal Regulations* (CFR) § 300.5 defines applicable requirements as "those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically

address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance found at a CERCLA site…" The NCP at 40 CFR § 300.5 defines relevant and appropriate requirements as "those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not 'applicable' to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations *sufficiently similar to those encountered at the CERCLA site and that their use is well suited to the particular site*…" (emphasis added).

Compliance with ARARs requires compliance only with the substantive requirements specified within the statute or regulation, and does not require compliance with procedural requirements, such as permitting, when response actions are conducted entirely on site. CERCLA § 121(e)(1) states that "No Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely onsite, where such remedial action is selected and carried out in compliance with this section." For any portion of a removal action conducted off site, such as off-site disposal in a permitted landfill, compliance with applicable requirements and with both substantive and procedural components is required.

Potential federal and state ARARs are identified in this EE/CA. Potential federal ARARs were identified based on a review of site-specific characteristics and removal action alternatives under evaluation, and federal environmental statutes and regulations. Potential state ARARs were identified based on a review of site-specific characteristics and removal actions under evaluation, and state-delegated environmental programs and other state environmental statutes and regulations. For a state requirement, including an applicable state requirement, to be identified as a potential state ARAR, the state requirement must be more stringent than the corresponding federal ARAR. EPA will select the final ARARs (no longer potential) in the Action Memorandum (AM).

ARARs are generally divided into three categories: chemical-, location-, and action-specific requirements. Chemical-specific ARARs are generally health- or risk-based numerical values or methodologies applied to site-specific conditions that result in establishment of cleanup levels. These values establish acceptable amounts or concentrations of chemicals that may be found in, or discharged to, the ambient environment. Chemicals found in the on-site buildings and building materials include pesticides, PCBs, and dioxins. No statutory or regulatory standards for pesticides or dioxins in building debris have been established that specify potential cleanup levels. PCBs found in the building material are in bulk product waste and are not considered PCB remediation waste because at the time of

designation for disposal, the PCB-contaminated building material is still attached to the building and the building demolition will be completed in the removal action (EPA 2012). However, PCB waste removed from metal materials to be recycled will be considered PCB remediation waste. Location-specific ARARs are restrictions or requirements placed on protected locations, including historic places, wetlands, and sensitive ecosystems or habitats. The site is not within a 100-year floodplain due to the presence of a levee. However, the site is within a 500-year floodplain, so potential location-specific ARARs were identified for protection of permanent and temporary facilities constructed at the site. No other protected or regulated resources are present at the building site, so no other potential location-specific ARARs were identified. Potential federal location-specific ARARs are identified in Table A-1 of Appendix A. No potential state location-specific ARARs were identified for protection of the floodplain. Potential action-specific ARARs are requirements triggered by a removal action on site. Action-specific ARARs generally do not determine the removal alternative; rather, they determine how an alternative must be implemented. No potential action-specific ARARs were identified for or are necessary for the No Action alternative. Potential federal action-specific ARARs are listed in Table A-2 of Appendix A. Potential state action-specific ARARs are listed in Table A-3 of Appendix A. Table 1 in Section 6.0 summarizes feasibility options.

3.0 NON-TIME CRITICAL REMOVAL ACTION AND REMOVAL ACTION OBJECTIVES

Several pesticides, dioxins and PCBs were detected in samples of building materials and concrete, and in wipe samples collected during the June 2016 sampling event. Pesticides detected in the slab foundations of the Maintenance Building and Building 4 contained Resource Conservation and Recovery Act (RCRA) listed wastes as a result of spills of listed waste when Aldrin (Hazardous Waste Code P004) stored in the Maintenance Building was transferred to Building 4 and sprayed onto fertilizer. A 2,000-gallon vessel stored in the Maintenance Building was used to heat Aldrin during formulation operations (Eckenfelder Inc. 1992).

It is unclear if contamination within the remaining buildings and slab foundations on site derived from poor waste management or releases of product that is not RCRA listed waste. Therefore, the source is unknown and is not considered a RCRA listed waste. The Production Building and Buildings 1, 2, and 3; and the slab foundation remaining for Building 5 may contain RCRA characteristic waste and therefore would be sampled prior to disposal.

Due to the change in land use from industrial to Central Business Mixed District C-3 B designation, as noted in Section 1.0, the remedy selected in the 1996 ROD is no longer protective of human health and the environment (EPA 2013, EPA 2016). Cleanup of site buildings and slab foundations will be implemented as a Non-Time Critical Removal Action under Section 104 of CERCLA, 42 US Code (USC) § 9604 and 40 CFR § 300.415 of the NCP. Historical remedial action objectives are included in the 1996 ROD (EPA 1996). Additional alternatives to address the buildings and slab foundations, which will meet these new removal action objectives, are evaluated in this EE/CA.

Removal action objectives for the site buildings include:

- Eliminate human exposure via inhalation, incidental ingestion, and dermal absorption to contamination present within site buildings.
- Prevent human exposure to COCs in potentially contaminated soil at levels that pose unacceptable risk to commercial and recreational users.

Cleanup levels for building materials and foundation slabs were not developed because building materials cannot be compared with published or site-specific risk-based screening levels for soil, sediment, surface water, groundwater, air or other natural media. Cleanup levels for soil have not been developed because the extent of potential contamination is unknown. However, if slab foundations are removed at the site, soils will be sampled to determine if an unacceptable health

risk is present and if present, cleanup levels will be developed for soil.

4.0 IDENTIFICATION OF REMOVAL ACTION ALTERNATIVES

Tetra Tech evaluated three alternatives addressing buildings and slabs that remain at the site, applying the three broad criteria described in EPA's Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA (EPA 1993a). The first alternative, which serves as a baseline, is known as the "No Action" alternative. The second alternative is building demolition with off-site disposal (Figure 6). The third alternative is building demolition with on-site containment that includes crushing building material on site, spreading the material across the site, and covering the fill with a cap (Figures 7 and 8). The following sections describe these alternatives.

4.1 ALTERNATIVE 1 – NO ACTION (BASELINE)

Alternative 1 is the CERCLA-required no-action alternative in which no removal action is undertaken. This alternative does not include further land use controls, containment, removal, treatment, or other mitigating actions beyond what has already been put in place as a result of the 1996 ROD, including the continued maintenance of the remedy in place and the performance of 5-year reviews as required by the NCP. Under Alternative 1, because no action is taken, the site remains unchanged. However, the changing land use of the site by its rezoning from industrial to mixed use, requires the demolition of contaminated on-site buildings. Potentially toxic and hazardous substances within the buildings and slab foundations present an actual or potential exposure to human health and the environment. Under Alternative 1, building contaminants that pose risk to human health would remain in place. The no action alternative provides a baseline for comparison to the other removal action alternatives.

4.2 ALTERNATIVE 2 – BUILDING DEMOLITION WITH OFF-SITE DISPOSAL

Alternative 2 includes demolition of buildings (Production Building and Buildings 1, 2, and 3) and slab foundations (Maintenance Building and Buildings 4 and 5) that currently remain on site, and disposal of demolition debris at an off-site landfill. Alternative 2 would include removal of PCB-contaminated insulation and asbestos prior to demolition activities. After demolition activities, areas previously hosting the buildings and slab foundations would be backfilled with soil and capped with a vegetative cover. However, it should be noted that a vegetative cap may not be required if soil samples are collected from the areas previously hosting the buildings and slab foundations and it is verified that levels of COCs do not exceed action levels (see Section 5.2.3 for potential cost savings without a vegetative cap).

Assumptions for Alternative 2 are as follows:

1. Collection of an estimated 100 samples is anticipated during the Asbestos Survey. Costs for this survey and report were estimated by application of the "RCRA Facility Investigation" technology in RACER. Cost items were removed that did not apply.

2. Roofing tar and boiler/piping insulation contain asbestos, and will be abated prior to demolition of buildings. This will be classified as asbestos-containing material (ACM) and disposed of off site as special waste. This includes roofing at the Production Building and Buildings 1, 2, and 3; and boiler/piping insulation at Building 1.

3. Insulation at the Production Building and Buildings 1, 2, and 3 is presumed to contain PCBs and will be removed prior to demolition of buildings and disposed of in accordance with 40 CFR § 761. Due to the additional restrictions associated with PCB disposal in Iowa, disposal will also be based on concentration as follows:

    a. Insulation and material with PCB concentrations > 50 parts per million (ppm) will be disposed of as bulk product waste at a Toxic Substances Control Act (TSCA)-approved landfill.

    b. Non-hazardous waste with PCB concentrations < 50 ppm will be disposed of at a solid waste landfill.

4. The Production Building is assumed to have no contamination that can be classified as hazardous waste by 40 CFR § 261, with the exception of PCBs in insulation and asbestos defined above, and debris can therefore be disposed of as non-hazardous waste at a local landfill. Portions of the concrete foundation may also be suitable for reuse as fill or road base, or other beneficial use.

5. Portions of the Maintenance Building and Building 4 foundations contain RCRA listed waste which will be disposed of at a RCRA Subtitle C landfill. The rest of these foundations not containing pesticides would be managed as solid waste or could be reused as fill or road base if appropriate.

6. Remaining slab foundations will be removed.

7. During demolition activities, metal materials (i.e., rebar, steel beams, etc.) will be separated and decontaminated as necessary. Metals will be recycled at a local scrap yard. It is assumed that the scrap yard will pay $90 per ton of metal based on current prices as of February 16, 2017. Residue from decontamination procedures determined to contain PCBs will be disposed of as PCB remediation waste.

8. For the purpose of this EE/CA, the following assumptions were made regarding the amount of metal within the structures on site:

Structure	Construction Material	Percent of Structure that Contains Metal
Slab Foundations	Reinforced Concrete	1%
Production Building (76%)	Masonry	10%
Production Building (24	Steel	100%

%)		
Building 1	Masonry	10%
Building 2	Masonry	10%
Building 3	Steel	100%
Walkway	Steel	100%

These assumptions are based on review of available photographs of the structures.

9. Demolition debris remaining following the above activities will be sampled to determine the concentration of any PCBs and whether the materials are classified as a RCRA characteristic waste. These sampling results will determine appropriate disposal methods and locations. For the purposes of this EE/CA, 25 to 75% of the remaining demolition debris is assumed to be RCRA hazardous waste due to RCRA characteristic waste. RCRA hazardous waste and material with PCB concentrations > 50 ppm will be disposed of at a TSCA-approved and RCRA Subtitle C landfill. All remaining debris determined to be non-hazardous will be disposed of at a local landfill or designated for beneficial use as appropriate

10. Demolition equipment will require decontamination. Equipment decontamination operations are anticipated to last 1 week. Costs include construction of a decontamination facility pad and disposal of wash water.

11. Disposal of demolition debris containing RCRA listed and characteristic wastes and PCB concentrations > 50 ppm will occur at a TSCA-approved and RCRA Subtitle C landfill. Transportation by rail and disposal charges will be $282.81 per ton, based on estimates received from disposal facilities.

12. Disposal of non-hazardous demolition debris will occur at the Metro Park East Landfill in Des Moines, Iowa at a rate of $39.90 per ton. Transportation by truck to the landfill will be $22.37 per ton.

13. The volume to weight conversion factor for construction and demolition waste is 0.625 tons per cubic yard based on the Kansas Department of Health and Environment (KDHE) Bureau of Waste Management (KDHE 2010). An Iowa-specific weight conversion was not found.

14. No soil will be removed as part of this alternative.

15. Land disposal restrictions (LDR) are applicable as appropriate.

4.3 ALTERNATIVE 3 – BUILDING DEMOLITION WITH ON-SITE CONTAINMENT

Alternative 3 includes demolishing buildings (Production Building and Buildings 1, 2, and 3) that currently remain on-site, crushing the building debris, spreading the debris across the site, and covering the fill with a cap. Slab foundations will remain in place. Building debris will be sampled to determine if it is RCRA characteristic hazardous waste or non-hazardous, and to determine if PCB contamination is present and the concentration. Non-hazardous debris with PCB concentrations < 1 ppm will be spread across the northern and western portions of the site and capped with a vegetative cover. However, it

should be noted that this vegetative cap may not be required depending on the planned redevelopment actions (see Section 5.3.3 for potential cost savings).

Hazardous debris with PCB concentrations > 1 ppm and < 50 ppm will be spread across the southern portion of the site under EPA's Area of Contamination (AOC) policy and will include the Maintenance Building and Building 4 slab foundations. This portion of the site would be restricted to low occupancy use only, requiring post-removal site controls. The southern portion of the site where hazardous waste is consolidated will be covered with a prescriptive cap following guidelines from EPA's "Technical Guidance Document: Final Covers on Hazardous Waste Landfills and Surface Impoundments" (EPA 1989) and EPA's "(Draft) Technical Guidance for RCRA/CERCLA Final Covers" (EPA 2004). The AOC policy allows that certain discrete areas of generally dispersed contamination may be considered RCRA landfills and would not typically constitute a new act of treatment, storage, or disposal that triggers additional RCRA requirements, like LDRs. Hazardous waste debris or debris that contain PCB concentrations > 50 ppm will be disposed of off-site in accordance with 40 CFR § 761. Metal building materials, ACM, and PCB-contaminated insulation will be removed prior to demolition activities.

Assumptions for Alternative 3 are as follows:

1. Collection of an estimated 100 samples is anticipated during the Asbestos Survey. Costs for this survey and report were estimated by application of the "RCRA Facility Investigation" technology in RACER. Cost items were removed that did not apply.

2. Roofing tar and boiler/piping insulation contain asbestos, and will be abated prior to demolition of buildings. This will be classified as ACM and disposed of off site as special waste. This includes roofing at the Production Building and Buildings 1, 2, and 3; and boiler/piping insulation at Building 1.

3. The insulation at the Production Building and Buildings 1, 2, and 3 is presumed to contain PCBs and will be removed prior to demolition of buildings and disposed of in accordance with 40 CFR § 761. Due to the additional restrictions associated with PCB disposal in Iowa, disposal will also be based on concentration. Insulation and material with PCB concentrations > 50 ppm will be disposed of as bulk product waste at a TSCA-approved landfill.

4. The Production Building is assumed to have no contamination that can be classified as hazardous waste, with the exception of PCBs in insulation and asbestos defined above.

5. The Maintenance Building and Building 4 foundations contain RCRA listed waste and will remain in place on site under a prescriptive cap.

6. All slab foundations will remain in place.

7. During demolition activities, metal materials (i.e., rebar, steel beams, etc.) will be separated and decontaminated as necessary. Metals will be recycled at a local scrap yard. It is assumed that the

scrap yard will pay $90 per ton of metal based on current prices as of February 16, 2017. Residue from decontamination procedures determined to contain PCBs will be disposed of as PCB remediation waste.

8. For the purpose of this EE/CA, the following assumptions were made regarding the amount of metal within the structures on site:

Structure	Construction Material	Percent of Structure that Contains Metal
Production Building (76%)	Masonry	10%
Production Building (24 %)	Steel	100%
Building 1	Masonry	10%
Building 2	Masonry	10%
Building 3	Steel	100%
Walkway	Steel	100%

These assumptions are based on review of available photographs of the structures.

9. Demolition debris remaining following the above activities will be sampled to determine the concentration of any PCBs and whether the materials are classified as a RCRA characteristic waste. These sampling results will determine appropriate disposal methods and locations. Based on June 2016 sampling of building debris, 30% of the remaining demolition debris is assumed to contain PCBs > 1 ppm and < 50 ppm, and will be spread across the southern portion of the site under the prescriptive cap. Of the remaining demolition debris, 25 to 75% is assumed to be hazardous RCRA characteristic waste.

10. Crushed materials will be spread on site and capped. Demolition debris determined to be hazardous will be spread on the southern portion of the site including the area where the foundations remain for the Maintenance Building and Building 4. This portion of the site would be restricted to low occupancy use only. The prescriptive cap will encompass 4 acres and include 2 feet of low permeability clay, 60/1,000-inch (60 mil) high-density polyethylene (HDPE) liner, drainage netting, 36-inch protection layer, 12 inches of top soil, and a vegetative cover. To meet the guidelines for the maximum permeability of clay, 2% sodium bentonite would be added to the clay layer. The non-hazardous demolition debris with PCB concentrations < 1 ppm will be spread across the northern and western portions of the site, and covered with a vegetative cap encompassing 13.4 acres. The vegetative cap will consist of 18 inches of soil (6 inches each of clay, fill, and topsoil) and vegetation that will be placed directly over the demolition debris.

11. Demolition equipment will require decontamination. Equipment decontamination operations are anticipated to last 1 week. Costs include construction of a decontamination facility pad and disposal of wash water.

12. Disposal of PCB wastes will occur at a TSCA-approved landfill. Transportation by rail and disposal charges will be $282.81 per ton, based on estimates received from disposal facilities.

13. The volume to weight conversion factor for construction and demolition waste is 0.625 tons per cubic yard based on KDHE Bureau of Waste Management (KDHE 2010). An Iowa-specific weight conversion was not found.

14. No soil will be removed as part of this alternative.

15. LDRs are applicable as appropriate.

5.0 ANALYSIS OF REMOVAL ACTION ALTERNATIVES

This section evaluates removal action alternatives applying the three broad evaluation criteria identified in EPA's Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA (EPA 1993a). These include effectiveness, implementability, and cost. State acceptance and community acceptance will be evaluated after receipt of public comment.

5.1 ALTERNATIVE 1 – NO ACTION (BASELINE)

The No Action alternative is required by the NCP and will serve as a comparative reference for other removal action alternatives.

5.1.1 Effectiveness

This section evaluates the effectiveness of Alternative 1 and its ability to meet the objective within the scope of the removal action.

Due to changing land use and the 2013 5-year review, an Ecological Risk Assessment (EPA 2015) and an updated HHRA (Tetra Tech 2017) were performed. The HHRA addendum identified unacceptable risk to human receptors at the SPA. The changing land use of the site by its rezoning from industrial to mixed use, requires the demolition of contaminated on-site buildings. Potentially toxic and hazardous substances within the buildings and slab foundations present an actual or potential exposure to human health and the environment. However, risk from contaminated building materials could not be evaluated because there are no published or site-specific risk-based screening. Alternative 1 would not be effective in the long term for anticipated future land use, and would not be a permanent remedy. Potential risk posed by contaminated building materials would remain unmitigated. Alternative 1 does not include treatment and would therefore not reduce toxicity, mobility, or volume through treatment. Alternative 1 would not provide any short-term effectiveness. Therefore, Alternative 1 is no longer protective of human health or the environment.

5.1.2 Implementability

This section evaluates the implementability of Alternative 1 including technical and administrative feasibility and availability of the various services and materials required to implement the removal action.

Alternative 1 would require no effort to implement and would not require availability of services and materials as it is the current remedy for the site. However, Alternative 1 would face administrative

hurdles, because it no longer addresses risk due to the anticipated future use. Potential administrative hurdles would include EPA acceptance of this alternative, updating the current ROD, and 5-year reviews.

5.1.3 Cost

There is no cost associated with Alternative 1.

5.2 ALTERNATIVE 2 – BUILDING DEMOLITION WITH OFF-SITE DISPOSAL

Alternative 2 involves removal of building materials, including contaminated materials that contain a RCRA characteristic or listed waste. PCB contaminated insulation and material with PCB concentrations > 50 ppm would be removed from the buildings and disposed of according to 40 CFR § 761 and Iowa regulations. All hazardous and non-hazardous waste would be transported to off-site landfills.

5.2.1 Effectiveness

This section evaluates the effectiveness of Alternative 2 in its ability to meet the objective within the scope of the removal action.

Alternative 2 rates high under this criterion and has a high degree of permanence. This alternative permanently reduces long-term risk to human receptors and—if risk posed by soil contamination is within an acceptable risk range or it is restored to site-specific cleanup levels—it restores the area occupied by buildings for anticipated future use. Building materials that pose a risk would be removed and permanently eliminated by demolition and disposal off site. This would reduce the volume of contaminants at the source through disposal in a secure and regulated landfill. Some of the material may also require treatment before disposal, which would reduce toxicity of the material. Contaminated soil that might pose a risk after building demolition would be mitigated indirectly through the implementation of a cap. Since contamination would remain on site, groundwater monitoring would be required. Groundwater monitoring and treatment are ongoing as part of the current ROD for OU1 (EPA 1986).

Alternative 2 would have moderate short-term effectiveness. Some risk to workers and the community would be posed during building demolition. Risk to workers would be mitigated through safe work practices, including use of personal protective equipment, dust suppression, and air monitoring. Potential for spill of contaminated material, and increased potential for vehicle collisions due to construction traffic, would be the primary risks to the community.

Alternative 2 would comply with ARARs.

5.2.2 Implementability

This section evaluates the implementability of Alternative 2 including technical and administrative feasibility and availability of the various services and materials required to implement the removal action.

Alternative 2 would have high implementability and is highly feasible. Technologies and skills necessary to implement the remedy would be readily available. Buildings and foundations could be demolished, crushed, or cut to required sizes and removed with reasonable accuracy. Materials, services, and equipment necessary for implementation of Alternative 2 are readily, commercially available. Disposal facilities are also readily available and have adequate capacity for the volumes of material being removed. Building demolitions, and removal and placement of fill and a cap are expected to take 3 months.

5.2.3 Cost

The cost of Alternative 2 in 2017 dollars is estimated to be between $11,127,000 and $12,846,000 depending on the amount of demolition debris determined to be hazardous. The estimated cost is sensitive to the volume of building material that must be removed off site and the quantity of building material determined to be hazardous due to RCRA characteristic or listed waste. The Production Building could be addressed under a separate action outside of the EE/CA as it was not part of the 1996 ROD. If the Production Building is not addressed under this EE/CA, the cost of Alternative 2 would be approximately $5,901,000 less, resulting in a total cost between $5,226,000 and $6,945,000 for Alternative 2. A breakdown of the cost for the Production Building alone is presented in Appendix C. Details of cost assumptions are presented in Appendix B.

Potential cost savings associated with this alternative are as follows:

- A vegetative cap may not be required if soil samples are collected from the areas previously hosting the buildings and slab foundations and it is verified that levels of COCs do not exceed action levels or if the timing of redevelopment would provide sufficient cover. This would result in a total potential cost savings of approximately $1,905,000, resulting in a total cost of between $9,222,000 and $10,941,000 depending on the amount of demolition debris determined to be hazardous. Details of cost assumptions are presented in Appendix D.

- Depending on redevelopment of the site, all slab foundations could remain in place. This would result in a total potential cost savings of approximately $3,329,000 to $4,031,000, resulting in a total cost of between $7,798,000 and $8,815,000 depending on the amount of demolition debris determined to be hazardous. Details of cost assumptions are presented in Appendix D.

- Depending on redevelopment of the site, building foundations could remain in place for the portions of the site in which the building structures have already been removed (i.e., portions of

Production Building, Maintenance Building, and Buildings 3, 4, and 5). This would result in a total potential cost savings of approximately $2,428,000 to $2,559,000, resulting in a total cost of between $8,699,000 and $10,287,000 depending on the amount of demolition debris determined to be hazardous. Details of cost assumptions are presented in Appendix D.

- Non-hazardous demolition debris with PCB concentrations < 1 ppm could potentially be disposed of on-site in the form of a berm along the edge of the property, approximately 3,615 feet in length. The berm would be approximately 4.5 feet high and would include 3 feet of debris, 18 inches of soil (6 inches each of clay, fill, and topsoil), and a vegetative cover. The berm would be approximately 101 to 110 feet wide, depending on the volume of non-hazardous debris, with a concrete sidewalk, 10 feet wide, for use as a walking path. This alternative provides another option, but does not provide significant cost savings. This alternative would result in a potential cost savings of approximately $232,000 if 25% of the building debris is non-hazardous and $350,000 if 75% of the building debris is non-hazardous, resulting in a total cost of between $10,777,000 and $12,614,000 depending on the amount of demolition debris determined to be hazardous. Potential additional costs such as drainage design and permitting have not been included. Details of cost assumptions are presented in Appendix D.

5.3 ALTERNATIVE 3 – BUILDING DEMOLITION WITH ON-SITE CONTAINMENT

Alternative 3 involves demolishing the buildings, crushing building debris, and leaving it on site. PCB contaminated insulation and material with PCB concentrations > 50 ppm would be removed from the buildings and disposed of according to 40 CFR 761 and Iowa regulations. All slab foundations would remain in place. Demolition debris determined to be non-hazardous and containing PCB concentrations < 1 ppm would be placed in the northern and western portions of the site and overlain by a vegetative cap, if needed (see Figures 7 and 8). The vegetative cap would encompass 13.4 acres and consist of 18 inches of soil (6 inches each of clay, fill, and topsoil) and vegetation. Approximately 1.6 to 1.8 feet of demolition debris would be used as a foundation layer, depending on the quantity of non-hazardous waste with PCB concentrations < 1 ppm (25-75%). Demolition debris determined to be hazardous and containing PCB concentrations < 50 ppm would be placed in the southern portion of the site and overlain by a RCRA-compliant cap that would consist of 2 feet of low permeability clay, 60-mil HDPE liner, drainage netting, 36-inch protection layer, 12 inches of top soil, and a vegetative cover (see Figures 7 and 8). This cap would encompass 4 acres and would include approximately 0.8 to 1.4 feet of demolition debris as a foundation layer, depending on the quantity of hazardous waste (25-75%). This portion of the site would be restricted to low occupancy use only, requiring post-removal site controls.

5.3.1 Effectiveness

This section evaluates the effectiveness of Alternative 3 in its ability to meet the objective within the scope of the removal action.

Alternative 3 rates moderate to high under this criterion. This alternative reduces long-term risk to human receptors by burying contaminated building materials under clean fill, isolating it from the environment and human receptors. It is unlikely that natural processes could uncover buried contaminated building material. However, since contaminants in building materials would be contained on site rather than removed and the caps would erode and settle over time, the alternative would require maintenance of the cap and implementation of post-removal site controls to remain protective.

Since contamination would remain on site, groundwater monitoring would be required. Groundwater monitoring and treatment are ongoing as part of the current ROD for OU1 (EPA 1986). As indicated by this monitoring, pesticide contamination in soil and fill below the buildings has not migrated to groundwater over the last few decades. The RCRA-compliant caps would limit infiltration of water through contaminated building materials. Leaching from building debris to groundwater is unlikely unless groundwater rises substantially. This alternative would protect groundwater in the long term.

Alternative 3 does not involve treatment and therefore would not reduce toxicity, mobility, or volume of contaminants through treatment.

Alternative 3 rates moderate to high for short-term effectiveness. Potential for exposure of workers or the community to contaminated building materials would be small because most material would be left on site. There would be some potential for community exposure when asbestos, PCBs, and metals are removed from the site for disposal/recycling. Increased risk of vehicular collisions would be posed because of construction traffic, removal of some building material, and transport of clean fill and seeding to the site.

Alternative 3 would comply with ARARs.

5.3.2 Implementability

This section evaluates the implementability of Alternative 3 including technical and administrative feasibility and availability of the various services and materials required to implement the removal action.

Alternative 3 rates moderately high for implementability and the availability of materials, services, and equipment necessary for its implementation. The remedy is straightforward, but may require specialized equipment to crush building debris. It would take approximately 4 months to implement. Alternative 3 involves demolishing buildings, removing metals, crushing concrete for fill, and installing RCRA-compliant caps.

Although Alternative 3 is feasible, and since contamination will be left on site redevelopment of the site would be limited. Land use in the surrounding area is changing, and much of this area has been rezoned since the remedy was selected for OU2 and OU4 in the 1996 ROD. The City of Des Moines is planning on conducting a major redevelopment project in the River Point West area east of the site.

5.3.3 Cost

The cost of Alternative 3 in 2017 dollars is estimated at $13,939,000. The estimated cost is sensitive to the design of the cap. The location of the on-site disposal may vary from that depicted in Figures 7 and 8 due to redevelopment. However, any costs associated with changing the location of the disposal would be the responsibility of the future developer. The Production Building could be addressed under a separate action outside of the EE/CA as it was not part of the 1996 ROD. If the Production Building is not addressed under this EE/CA, the cost of Alternative 3 would be approximately $4,606,000 less, resulting in a total cost of approximately $9,333,000 for Alternative 3. A breakdown of the cost for the Production Building alone is presented in Appendix C. Details of cost assumptions are presented in Appendix B.

Potential cost savings associated with this alternative are as follows:

- A vegetative cap may not be required for non-hazardous debris if redevelopment of the site is to occur immediately following demolition activities. This would result in a potential cost savings of approximately $3,620,000, resulting in a total cost of $10,319,000. Details of cost assumptions are presented in Appendix D.

- Non-hazardous demolition debris with PCB concentrations < 1 ppm could potentially be disposed of on-site in the form of a berm along the edge of the property, approximately 3,615 feet in length. The berm would be approximately 4.5 feet high and would include 3 feet of debris, 18 inches of soil (6 inches each of clay, fill, and topsoil), and a vegetative cover. The berm would be approximately 90 feet wide with a concrete sidewalk, 10 feet wide, for use as a walking path. A small vegetative cap, approximately 2.3 acres in size would still be required to cover the slab foundations of Buildings 1, 2, and 3. This alternative would result in a total potential cost savings of approximately $582,000, resulting in a total cost of about $13,357,000. Potential additional costs such as drainage design and permitting have not been included. Details of cost assumptions are presented in Appendix D.

6.0 COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES

Tetra Tech compared the three removal action alternatives detailed in Section 5.0 according to three broad criteria defined in EPA's Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA (EPA 1993a):

1. Effectiveness
2. Implementability
3. Cost

The results are summarized in Table 1.

TABLE 1

SUMMARY OF FEASIBILITY OPTIONS

Screening Criteria	Alt. 1: No Action	Alt. 2: Building Demo with Off-site Disposal	Alt. 3: Building Demo with On-site Containment
1. Effectiveness	Not effective	Yes. Moderate to High	Yes. Moderate to High
2. Implementability	Yes. Nothing required to implement; however would likely face administrative hurdles.	Yes. High	Yes. Moderate to High
3. Cost	No cost	$11,127,000 to $12,846,000	$13,939,000

Note:

Costs do not include potential cost savings discussed in Sections 5.2.3 and 5.3.3.

The Production Building could be addressed under a separate action outside of the EE/CA as it was not part of the 1996 ROD. If the Production Building is not addressed under this EE/CA, the cost of Alternative 2 would be approximately $5,901,000 less, and the cost of Alternative 3 would be approximately $4,606,000 less. A breakdown of the cost for the Production Building alone is presented in Appendix C.

Potential cost savings for Alternative 2, building demolition with off-site disposal, and Alternative 3, building demolition with on-site containment, are shown in Tables 2 and 3 below, respectively, and in Figure 9.

TABLE 2

SUMMARY OF POTENTIAL COST SAVINGS FOR ALTERNATIVE 2

Option	Potential Cost Savings	Total Cost
No Cap Required	$1,905,000	$9,222,000 to $10,941,000
Leave All Slab Foundations in Place	$3,329,000 to $4,031,000	$7,798,000 to $8,815,000
Leave Slab Foundations in Place for Portions of Production Building, Maintenance Building, and Buildings 3, 4, and 5	$2,428,000 to $2,559,000	$8,699,000 to $10,287,000
Dispose of Non-hazardous Waste in Berm	$232,000 to $350,000	$10,777,000 to $12,614,000

Note:

EE/CA Engineering Evaluation/Cost Analysis

TABLE 3

SUMMARY OF POTENTIAL COST SAVINGS FOR ALTERNATIVE 3

Option	Potential Cost Savings	Total Cost
No Cap Required	$3,620,000	$10,319,000
Dispose of Non-hazardous Waste in Berm	$582,000	$13,357,000

Note:

EE/CA Engineering Evaluation/Cost Analysis

Based on results of this EE/CA, No Action (Alternative 1) is not effective because it does not actively seek to reduce or eliminate potential risk to human health and the environment based on changes in land use and potential for future development of the site.

Building demolition with on-site containment (Alternative 3) satisfies most of the criteria, but is the most expensive and does not reduce the volume of contamination on site as much as Alternative 2. In addition, Alternative 3 limits the use of the site, as the prescriptive cap would allow for low occupancy use only. Building demolition with off-site disposal (Alternative 2) satisfies more of the criteria, including reducing the volume of contamination on site and potentially reducing the toxicity of COCs, and is less expensive than Alternative 3.

Details of cost assumptions are presented in Appendix B. Figures 6, 7, and 8 show conceptual models of the removal action alternatives—Alternatives 2 and 3. State and community acceptance will be evaluated following the public comment period.

7.0 RECOMMENDED REMOVAL ACTION ALTERNATIVE

Tetra Tech was tasked by EPA under EPA START 4 Contract No. EP-S7-13-06, Task Order No. 0144 to prepare an EE/CA for removal of buildings and foundations at the Des Moines TCE site. The site is in south-central Des Moines on the east side of the Raccoon River. The property is owned by Dico, and contamination at the site resulted mainly from Dico's operations over 40 years that included steel wheel manufacturing, and chemical and pesticide formulation.

Pesticides detected in the Maintenance Building and Building 4 are RCRA listed wastes because of Dico's previous regulated activities of pesticide formulation.

Tetra Tech evaluated three removal action alternatives: (1) "No Action," which is the baseline alternative; (2) removing all building materials, with the debris sent off site to a regulated disposal facility; and (3) demolishing the buildings, crushing all building debris that would then be left on site, spreading the material across the site, and covering the fill with a cap. Details of these removal action alternatives are presented in Section 4.0. Removal action alternatives were compared to three screening criteria in Section 5.0.

Based on results of this EE/CA, No Action (Alternative 1) no longer complies with many of the three criteria because it does not actively protect human health and the environment based on changes in anticipated future land use. It is the most cost effective alternative because nothing would be implemented beyond what has already been put in place as a result of the 1996 ROD.

Building demolition with on-site containment (Alternative 3) satisfies many of the criteria, but is the most expensive. Building demolition with off-site disposal (Alternative 2) satisfies more of the criteria, including reducing the volume of contamination on site and toxicity of COCs, and is less expensive than Alternative 3.

EPA's preferred alternative for addressing contamination within buildings is Alternative 2, Building Demolition with Off-site Disposal, and includes demolishing buildings and slab foundations, disposing of any hazardous debris at an off-site landfill, and capping exposed soil with a vegetative cover, depending on potential unacceptable risk from site soils and redevelopment plans. The cost for this option is estimated to be between $11,127,000 and $12,846,000 depending on the amount of demolition debris determined to be hazardous and the need for the vegetative cover. This alternative achieves substantial risk reduction and addresses the buildings as a source of contamination at the site. The proposed non-time critical removal action will be consistent with the final remedy for the site.

8.0 REFERENCES

Black & Veatch Special Projects Corp. 1996. Final Feasibility Study for the Des Moines TCE Site Operable Unit Nos. 2 and 4, Des Moines, Iowa. May 30.

Eckenfelder Inc. 1992. Des Moines South Pond/Drainage Area; Source Control Operable Unit (Operable Unit No. 4); Building Sampling, Analyses, and Engineering Evaluation Report. August.

Kansas Department of Health and Environment (KDHE). 2010. Bureau of Waste Management Policy 10-02 related to Construction and Demolition Waste: Volume to Weight Conversion Factor. April.

Tetra Tech, Inc. (Tetra Tech). 2017. Supplemental Remedial Investigation Report, Des Moines TCE Site OU2 and OU4, Des Moines, Iowa, Risk Assessment Addendum. January.

U.S. Environmental Protection Agency (EPA). 1986. Superfund Record of Decision: Des Moines TCE, IA. EPA/ROD/R07-86/005. July 21.

EPA. 1989. Technical Guidance Document: Final Covers on Hazardous Waste Landfills and Surface Impoundments. EPA 530-SW-89-047. July.

EPA. 1992. Superfund Record of Decision: Des Moines TCE, IA. EPA/ROD/R07-92/057. September 18.

EPA. 1993a. Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA. EPA540-R-93-057, OSWER 9360.0-32. August.

EPA. 1993b. Response Actions at Sites with Contamination Inside Buildings. OSWER Directive 9360.3-12. August.

EPA. 1996. EPA Superfund Record of Decision: Des Moines TCE, EPA ID: IAD980687933, OU 02, 04, Des Moines, IA. December.

EPA. 2000. Use of Non-Time-Critical Removal Authority in Superfund Response Actions. February 14.

EPA. 2004. (Draft) Technical Guidance for RCRA/CERCLA Final Covers. EPA 540-R-04-007, OSWER 9283.1-26. April.

EPA. 2012. Fact Sheet. Fifth Five-Year Review to Begin, Des Moines TCE Superfund Site, Des Moines, Polk County, Iowa. February. https://archive.epa.gov/region07/factsheets/web/html/5th_five_yr_des_moines_tce_sprfnd_des_moines_ia.html

EPA. 2012. PCB Bulk Product Waste Reinterpretation. Office of Resource Conservation and Recovery. October 24.

EPA. 2013. Fifth Five Year Review Report, Des Moines TCE Superfund Site, Des Moines, Polk, County, Iowa. April 9.

EPA. 2015. Ecological Risk Assessment for Des Moines TCE Site, Operable Unit 04. October.

EPA. 2016. Addendum to Des Moines TCE Site Five-Year Review Report, dated April 9, 2013. July.

FIGURES

BUILDING SAMPLE RESULT TABLES

APPENDIX A

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

APPENDIX B

COST ESTIMATE

APPENDIX C

COST BREAKDOWN FOR PRODUCTION BUILDING

APPENDIX D

COST SAVINGS ANALYSIS

ALTERNATIVE 2

BUILDING DEMOLITION WITH OFF-SITE DISPOSAL

ALTERNATIVE 3

BUILDING DEMOLITION WITH ON-SITE CONTAINMENT